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10/579,201	05/12/2006	Chris Udo Maeding	P29504	8924
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EXAMINER NGUYEN, ANDREW H				
ART UNIT		PAPER NUMBER		
3741				
NOTIFICATION DATE		DELIVERY MODE		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary**Application No.**

10/579,201

Applicant(s)

MAEDING, CHRIS UDO

Examiner

ANDREW NGUYEN

Art Unit

3741

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 March 2011 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-940)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. *Therefore, the "swirler space comprises a tapering area (claim 14)" must be shown or the feature(s) canceled from the claim(s). The drawings show the inner surface of the outer element angled where the bores are located, but the inner element follows the same angle. Thus, the area of the passage does not actually change (a "taper" requires a decrease in area).* No new matter should be entered.
2. The drawings (figures 1A, 1B, 2A, 2B, 5, and 6) are objected to because solid black shading is not permitted. See 37CFR 1.84 (m). Appropriate correction is required.
3. The drawings (figures 5 and 6) are objected to because lines, numbers and letters are not uniformly thick and well defined (poor line quality). See 37CFR 1.84 (l). Appropriate correction is required.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for

consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claims 20 and 26 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 28-30 and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by US 3,498,059 (Gradon)

Regarding claim 28:

Gradon teaches:

A method of injecting fuel into a combustion chamber comprising:

guiding fuel into the combustion chamber through a first outlet opening (Fig 2; opening 31);
guiding fuel into the combustion chamber through a second outlet opening arranged coaxially with the first outlet opening (opening 40); and
forming a cooling liquid film layer in the combustion chamber through bores arranged to coaxially surround the first outlet opening (bores 64; col 3 lines 45-54 – film of fuel on surface 55; the injectors are in a combustion chamber, thus, surface 55 is in the combustion chamber).

Regarding claim 29:

Gradon teaches the liquid film layer directed at least in part towards a combustion space inner wall (surface 55 can be considered "a combustion space inner wall" because it is a wall and it is within a combustion space).

Regarding claim 30:

Gradon teaches the bores coaxially surrounding the second outlet opening (the bores 64 are radially outward of the opening 40).

Regarding claim 32:

Gradon teaches the fuel for forming the film supplied from the same fuel supplying the second opening (both supplied from source 41).

7. Claims 28, 29 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by US 3,866,413 (Sturgess 413).

Regarding claim 28:

Sturgess 413 teaches a first outlet opening (opening through element 15, Fig 1), second outlet opening (passage through element 34), and bores coaxially surrounding the first opening (bores 17 surround the element 15). The bores inject fuel onto a prefilming surface 18 (i.e. they create a film layer).

Regarding claim 29:

The surface 18 is considered a combustion space inner wall.

Regarding claim 31:

The fuel source that feeds the first outlet opening also feeds the orifices 17 (source 9).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 12-16, 19-22, 25-27, and 33-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,916,896 (Paul) in view of US 3,498,059 (Gradon) and US 5,673,554 (DeFreitas).

Regarding claim 12 and 20:

Paul teaches:

An injection element that is a rocket drive injection element (Fig 15; injection elements 21 and 12 for the rocket; see col 2 ll. 53-61)

Gradon teaches:

An injection element, comprising: a front face surface (Fig 2; surface including openings 40 and 31); an inner element with a first outlet opening (Fig 2; element 30 with opening 31); an outer element (element 56), comprising:
at least one second outlet opening structured and arranged for receiving and injecting fuel in a combustion space, and arranged coaxially to the first outlet opening (56 has an annular opening 40 coaxial with element 30 and receives fuel from fuel conduit 46; injects fuel into combustion space); and
third outlet openings radially beyond the at least one second outlet opening composed of bores structured and arranged for forming a cooling liquid film layer, wherein the bores are arranged along a ring, which is coaxial to the first outlet opening and the at least one second outlet opening (Fig 2; bores 64 are arranged in a ring around element 56, which is coaxial with the first outlet), wherein at least two of the first outlet opening, the at least one second outlet opening and the third outlet openings are arranged on the front face surface (the first opening 31 and the second opening 40 are on the same surface)
wherein the bores open to the combustion space (the burner is part of the “combustion space” – thus, areas of the burner are also considered “combustion space”; the bores open to a passage in the burner, which can be considered a “combustion space”).

Paul is silent as to an injection element with an inner element with a first outlet, outer element with a second outlet, third outlets composed of bores arranged

along a ring radially beyond the second outlet opening, and wherein at least two of the first outlet, second outlet, and third outlet openings are arranged on a front face surface. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute a fuel injector comprising an inner element with a first outlet, outer element with a second outlet, third outlets composed of bores arranged along a ring radially beyond the second outlet opening, and wherein at least two of the first outlet, second outlet, and third outlet openings are arranged on a front face surface into the rocket of Paul in order to inject fuel and air, as taught by Gradon (see Fig 2; inner element 30, outer element 56). Even though Gradon's fuel injector is utilized in a gas turbine and not a rocket, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute Gradon's fuel injector into Paul's rocket engine since rockets and gas turbines are closely related and it was known to share combustion technology between the two types of engines, as taught by DeFreitas (col 3 ll. 52-58).

Regarding claims 13 and 14:

Gradon teaches the outer element comprising a swirler space (slots 47 create a swirl – see col 3 lines 17-18) and a tapering area where the bores are located (see Fig 2 – the passage where the bores are located has a tapering passage width – passage 46 tapers into the swirler space 47).

Regarding claim 15:

Gradon further teaches the bores arranged such that a cooling film layer and a fuel do not touch just after entry into the combustion space (see Fig 2; film layer on the outside of the outer element on surface 55 is separate from inner element fuel just after entry into the combustion space). It would have been obvious to one of ordinary skill in the art at the time of the invention to form a cooling film layer in the injector of Paul in view of Gradon and DeFreitas in order to cool the surface, as taught by Gradon.

Regarding claim 16:

Gradon teaches an annular gap that communicates with the bores and wherein there is a swirl (annular gap 46, swirl passages 47). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide an annular gap in the injector of Paul in view of Gradon and DeFreitas in order to swirl the fluid, as taught by Gradon.

Regarding claim 19:

Gradon teaches component feed bores (component feed bores 24) such that the fluid from the component feed bores mix with fluid from the bores (fluids will mix after exiting the injector). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide component feed bores in the injector of Paul in view of Gradon and DeFreitas in order to provide fluids to the injector, as taught by Gradon.

Regarding claims 21:

Gradon teaches the outer element and inner element being coaxial (Fig 2). It would have been obvious to one of ordinary skill in the art at the time of the invention to

make the outer and inner elements coaxial in Paul in view of Gradon and DeFreitas as a matter of obvious design choice, as taught by Gradon.

Regarding claims 22 and 26:

Paul teaches:

An injection element that is a rocket drive injection element (Fig 15; injection elements 21 and 12 for the rocket; see col 2 ll. 53-61)

Gradon teaches:

An injection element, comprising: a front face surface (Fig 2; surface including openings 40 and 31); an inner element comprising a first outlet opening (Fig 2; inner element 30, first outlet opening 31); an outer element with at least one second outlet opening structured and arranged for receiving and injecting fuel in a combustion space, and arranged coaxially to the first outlet opening (outer element 56, second outlet opening 40 coaxial with 31);

the inner element further comprising third outlet openings composed of bores structured and arranged for forming a cooling liquid film layer, wherein the bores are arranged along a ring, which is coaxial to the first outlet opening and the at least one second outlet opening to surround the first outlet opening (inner element has third outlet openings 45 which are coaxial with the first outlet and surround the outlet opening), wherein at least two of the first outlet opening, the at least one second outlet opening and the third outlet openings are arranged on the front face surface (the first opening 31 and the second opening 40 are on the same surface)

wherein the bores open to the combustion space (the burner is part of the “combustion space” – thus, areas of the burner are also considered “combustion space”; the bores open to a passage in the burner, which can be considered a “combustion space”).

Paul is silent as to an injection element with an inner element with a first outlet, outer element with a second outlet, third outlets composed of bores arranged along a ring surrounding the first outlet opening, and wherein at least two of the first outlet, second outlet, and third outlet openings are arranged on a front face surface. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute a fuel injector comprising an inner element with a first outlet, outer element with a second outlet, third outlets composed of bores arranged along a ring surrounding the first outlet opening, and wherein at least two of the first outlet, second outlet, and third outlet openings are arranged on a front face surface into the rocket of Paul in order to inject fuel and air, as taught by Gradon (see Fig 2; inner element 30, outer element 56). Even through Gradon’s fuel injector is utilized in a gas turbine and not a rocket, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute Gradon’s fuel injector into Paul’s rocket engine since rockets and gas turbines are closely related and it was known to share combustion technology between the two types of engines, as taught by DeFreitas (col 3 ll. 52-58).

Regarding claim 25:

Gradon teaches component feed bores (component feed bores 24) such that the fluid from the component feed bores mix with fluid from the bores (fluids will mix after exiting the injector). It would have been obvious to one of ordinary skill in the art at the time of the invention to use component feed bores in the burner of Paul in view of Gradon and DeFreitas in order to supply fluids to the burner, as taught by Gradon (component feed bores 24).

Regarding claim 27:

Gradon teaches the outer element and inner element being coaxial (Fig 2). It would have been obvious to one of ordinary skill in the art at the time of the invention to make the outer and inner elements coaxial in Paul in view of Gradon and DeFreitas as a matter of obvious design choice, as taught by Gradon (Fig 2).

Regarding claims 33 and 34:

Gradon teaches:

in combination with a combustion chamber, wherein the third outlet openings are structured and arranged for forming the cooling liquid film layer on a wall of the combustion chamber (surface 55 can be considered a “wall of the combustion chamber” since it is inside the combustor; a film of fuel is injected onto the surface – col 3 line 50; when the openings 24 are defined as the third outlet openings, fuel flowing through passage 27 can be considered a “film”).

It would have been obvious to one of ordinary skill in the art at the time of the invention to form a cooling liquid film layer on a wall of the combustion chamber

of Paul in view of Gradon and DeFreitas in order to prevent the formation of the carbon deposits and cool the surface, as taught by Gradon (col 3 lines 50-55).

Regarding claims 35 and 36:

Gradon teaches each of the first opening, second opening, and third outlet openings arranged on the front face surface (Fig 2; openings 31, 40, and 64 are all located on an exterior surface of the injector). "Surface" is defined as "the exterior or upper boundary of an object or body" (Merriam Webster). The front face surface of the injection element can be considered the exterior of the inner and outer elements, and all of the openings are arranged on the exterior of the inner and outer elements, satisfying the claim limitation. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the outlet openings on the front face surface in the burner of Paul in view of Gradon and DeFreitas as a matter of obvious design choice, as taught by Gradon (see Fig 2).

10. Claims 17, 18, 23 and 24 rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,916,896 (Paul) in view of US 3,498,059 (Gradon) and US 5,673,554 (DeFreitas) as applied to claims 12 and 22 above, and further in view of US 3,703,259 to Sturgess et al (Sturgess)

Regarding claims 17 and 18:

Paul in view of Gradon and DeFreitas is silent as to the uniformity of the bores. Sturgess teaches the bores distributed uniformly about the circumference of the outer element (see Fig 7; one bore at the top, one at the bottom; can also be considered a

"portion"). It would have been obvious to one of ordinary skill in the art at the time of the invention to arrange the bores of Paul in view of Gradon and DeFreitas uniformly about the circumference in order to provide uniform flow, as taught by Sturgess (see Fig 7).

Regarding claims 23 and 24:

Paul in view of Gradon and DeFreitas is silent as to the uniformity of the bores. Sturgess teaches the bores being uniformly distributed about an entire circumference of the inner element (see Figs 2 and 1; can also be considered a "portion" of an entire circumference). It would have been obvious to one of ordinary skill in the art at the time of the invention to arrange the bores of Paul in view of Gradon and DeFreitas uniformly about the circumference in order to provide uniform flow, as taught by Sturgess (see Figs 2 and 1).

Response to Arguments

11. Applicant's arguments with respect to claims 12-27, and 33-36 have been considered but are moot in view of the new ground(s) of rejection. Applicant's arguments with respect to the drawings and to claims 28-32 are not persuasive.

Applicant asserts that the figures show a tapering area, at least in Figures 1A and 1B. Examiner disagrees and asserts that the claim requires "the swirler *space* comprises a tapering area". The Figures show the outer element and the inner elements tapering in cross sectional area, but they taper together such that the space between them does not decrease in area. Thus, the swirler *space* is not shown as tapering. Examiner further asserts that some of the figures are still improperly shaded and some

figures still comprise poor line quality (see Figure 2 of Gradon as an example of a proper cross sectional figure with cross hatching). Applicant's Figures 5 and 6 have ill-defined lines. For example, some of the holes 52 are not complete or are messy. Some of the lines defining the injector are broken and messy.

Applicant asserts that Gradon does not teach that the bores open to the combustion space or "forming a cooling liquid film layer in the combustion chamber". Examiner disagrees. The burner may be considered as part of the combustor and the combustion space. Thus, walls and surfaces of the burner and spaces in the burner may be considered as a part of the combustion space. The claims do not define the limits of "the combustion space". Furthermore, "the combustion space" does not carry special meaning in the art (i.e. it does not exclude the burner from being a part of the combustion space). One of ordinary skill in the art would reasonably construe the burner as being a part of the combustor.

With regards to Applicant's assertion that Gradon does not teach a cooling liquid film layer and instead teaches a film layer that is used to prevent the formation of carbon deposits, Examiner asserts that whether the liquid film layer is used to cool or to prevent carbon deposits, Gradon meets the claim limitation by teaching forming a liquid film layer. Examiner further asserts that because the film of Gradon is liquid, it will absorb heat from the nozzle. Finally, the formation of carbon deposits is caused by excessive heat. Therefore, in order to prevent carbon deposits, the film layer must cool the surface.

With regards to Applicant's assertion that Sturgess 413 does not disclose forming a cooling liquid film layer in the combustion chamber because the surface 18 cannot be considered a combustion space inner wall, Examiner disagrees. The bores 17 are taught as creating a film on the surface 18. The burner is considered a part of the combustion chamber and as such, walls of the burner are also considered walls of the combustion chamber. Applicant should further specify in the claims what walls the claim refers to and how they are arranged with respect to the burner.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANDREW NGUYEN whose telephone number is (571)270-5063. The examiner can normally be reached on Monday - Friday 8 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ehud Gartenberg can be reached on (571)-272-4828. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/AN/

/Ehud Gartenberg/
Supervisory Patent Examiner, Art Unit 3741